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The mail was put into the wagon, and a prouder dog never lived than Fido when his mistress came out to meet him, and, looking into his big brown eyes, said: "You are a good dog, Fido."

Old Bob was not forgotten, either, for his mistress fed him herself that day, giving him the best dinner he had ever had and a dessert of lump sugar.

FIRST GRADE.

ELSIE AMY WYGANT.

MATHEMATICS IN THE FIRST GRADE.

IN the November number of the ELEMENTARY SCHOOL TEACHER Mr. George W. Myers gives a tentative outline of work for each grade in the School of Education. Mr. Myers emphasizes the fact that this was presented, not at all as a hard and fast course in mathematics, but as a suggestive outline and an analysis of the abstract number which grows out of such use of number as is needed for clear imaging in history, geography, science, manual training, and cooking.

Mr. Myers states the "abstract outcome of the number work of the first year" as:

> (1) The whole numbers and their notation up to 12 or 15. (2) The meaning of +, read "and" at first, later "plus;" –, read at first "less" or "taken from," later "minus;" ×, read "times" or "multiplied by;" ÷, read at first "is how many times," later "divided by;" and =, read at first "are," later "equals." (3) All the fundamental addition facts, such as $2+3=5$, $4+5=9$, etc., using sums not exceeding 12 or 15. (4) All the correlative subtraction facts, such as $5-2=3$, $5-3=2$, $9-4=5$, $9-5=4$; etc. (5) Halves, thirds, fourths, and fifths of numbers up to about fifteen, and how to write and read them. (6) Yard, foot, inch, pint, quart, peck, bushel, gallon, cent, nickle, dime, and dollar, and their abbreviations, learned by using the measures.

Not as a criticism of the outline here given, but simply as an expression of how far the experience of this half-year, with this particular group of children, has confirmed the statement, and how far the actual demands for number have modified it, the following results of the practical work are given.

The outcome in mathematical conceptions and power to handle numbers, up to date, at the end of one half-year, seems to be:

(1) Notation and relation of numbers up to 12.

(2) Notation to 100 by ones or twos.

(3) Use of +, read "plus" or "and;" =, read "are."

(4) Addition of numbers whose sum does not exceed 12, and correlative subtraction (not at present automatic, but rapidly becoming so).

(5) ½, ⅓, ¼, and ⅛ of one thing; ½ and ¼ of 12; ½ of 10; ½ of 20: ½ of ½, ½ of ¼, ½ of ¾ (not automatic, but understood sufficiently to be used by the children in independent work); ½ of ½ (automatic); ¼ + ¼ + ¼; ½ + ¼; ¼ + ⅛.

(6) Units: inch, foot, gram, gill, pint, cubic inch, Fahrenheit degree.

(7) Geometric forms: circle, square, oblong (rectangle), cube, sphere, brick.

Judging from past experience of this year and from the present plan of work, the children will fail to know the following items included in the quoted outline:

There has been no occasion when either the words or the symbols × and ÷ could have been used with any economy either in directness of speech or accuracy of thought.

No work has required the use of 15, certainly not repeatedly enough to familiarize the children with it or its parts.

There seems to be no occasion within the present choice of subjects for the units of measure "peck" and "bushel," and the teaching of these terms will wait upon the necessity.

Among the things likely to be required in the second half of the year, but not suggested in the outline, are:

1. Writing of numbers to 80 (limited to 80 as the probable highest temperature to be recorded).

2. $\frac{1}{3}$ and $\frac{1}{6}$ of 12. $\frac{1}{2}$, $\frac{1}{4}$, and $\frac{1}{10}$ of $1. (used in keeping accounts).

3. Units: square inch, ounce, and pound, and images of both the number and the appropriate physical sensations of 0°, 32°, 50°, 70°. (These particular degrees are cited because in each case some strongly marked or frequently repeated experience has been associated with that temperature, as 0° means extreme cold; 32°, freezing; etc.)

Only such number work has been taught as was demanded by the work upon which the children were engaged. When a subject could be made clearer, or when a thing to be made needed a certain use of number, the number demanded by the occasion was taught.

Sometimes doing the thing once was sufficient; the given act, measurement, or relation was available without difficulty when next needed. At other times, once was not enough, and in such cases the drill necessary to give the child a ready use of the fact was undertaken.

For instance, the gill measure had been used more than once in cooking. Last week each child had a cocoanut, the milk of which we were to use for lunch. Each found how much his cocoanut contained, which happened to be about one gill.

When the class attempted to measure, it was evident that the previous uses had not taught the gill nor its relation to one pint. So again the children experimented with the gill and pint measures, and the next lesson was made to continue with the following drill on the liquid measures:

> A number of one-gill, two-gill, and pint measures were placed on the table. After finding the capacity of each, we played milkman. This play was twenty minutes of drill—drill largely originated by the children and unreservedly entered into by them.

This game was chosen because, aside from the value of the play itself, it offered an opportunity for the children to buy and sell, to originate problems, and to use the measures, not in an isolated way, but in a natural domestic transaction. The play was spontaneous, being but slightly directed by the suggestions of the teacher, who served as the milkman's assistant.

The following incident shows a child's freedom in the use of number and his play interest in its manipulation:

> One of the boys came to the store and asked for three gills of cream. He was told that cream was two cents a gill. He handed out imaginary change. "How much did you want to give me?" was asked by the assistant milkman. "Six cents." "But you gave me a dime." "Keep the change," was the instant reply, "and tomorrow when I buy three gills I will bring only two cents."

Another instance of drill:

> When the children made calendars for a valentine, it was necessary to

know how to write the figures to 31. The children saw the necessity of writing them neatly and legibly. With this motive they imposed upon themselves sufficient drill to obtain that skill before the work on the calendar was undertaken.

OUTLINE FOR MARCH AND APRIL.

Geography.— During March and April the work on sources of food will be continued in a study of transportation,with the attention directed chiefly toward railroad transportation.

Visit the Field Museum to see exhibit of primitive and foreign methods of transportation, telling such stories as these suggest.

REFERENCES: Kirkman, "Origin and Diversity of Transportation," Vol. III, chap. 1, and the chapter on "Primitive and Prehistoric Carriers," *Science of the Railways* (K 5775, Chicago Public Library call number).

Visit to yards of Rock Island Railroad, on Forty-seventh street, near Wentworth avenue. Things to be seen on this trip:

(1) Cattle cars, chicken cars, fruit cars, flat cars, box cars, caboose, ready for service and in various stages of construction; (2) casting of wheels; (3) making of parts of an engine; (4) putting the engine together.

Tell stories of heroism of engineers, selected from Cy Warman's "Engineer Stories," *McClure's* 1900–1901; Kipling, ".007," *A Day's Work;* Howell, "Pony Engine," *Christmas Every Day in the Year, and Other Stories.*

Science.—1. Water: Uses to man for drinking, cooking, and cleansing; in running mills, as steam, in transportation. These, and as many other uses of water as possible, the children will be helped to find during our study of this subject, and to record on a large chart as they discover them.

2. Rain: Its formation illustrated by experiments in condensation and evaporation. Percolation through different kinds of soil, as one guide in choosing garden soil.

How to purify water; various experiments for that purpose. The children have already discovered that the sand somewhat purifies water which has drained through it. Continue and show distillation.

REFERENCES: Jackman, *Nature Study for the Grammar Grades;* Howe, *Systematic Nature Study;* Tyndall, *Forms of Water;* King, *The Soil;* any good Meteorology; Rowell, *Cause of Rain* (K 7455, Chicago Public Library number); Jones, *The Water World* (K 7388); Angus Smith, *Air and Rain* (K 7554).

History.—Making floor coverings for the parlor of the playhouse, either a rug or a carpet. Visit: a loom in operation; Assyrian women spinning; South Americans weaving tapestry; display of oriental rugs.

Each child will be given a part of a sheepskin to wash, shear, card, spin, dye, and weave.

The looms are ready for use. (See description of same in ELEMENTARY SCHOOL TEACHER, Vol. II, No. 4, p. 305.)

REFERENCES: Lister, *Manufacturing Processes of Wool and Worsted* (K 13955, Chicago Public Library catalogue); McLaren, *Spinning Wool and Worsted* (K 6058); "Origin and Ancient History of Sheep," *Pastoral Life and Manufacture of the Ancients* (K 6021); Ashenhurst, *Design in Textile Fabrics* (K 6025); Lord, *Decorative and Fancy Textiles* (with designs and illustration) (K 13946).

Number.— Such as is required in the making of a freight car. In connection with geography, after the visit to the Rock Island Railroad yards, each child will make a freight car in woods, casting wheels of lead. This will require both linear and cubic measure.

Science work demands: (1) area of one square foot; (2) volume—12 cubic inches, seen in various shapes, as 12 × 12 × 1, or 12 × 6 × 2, etc.

Number in history: Plan rug or carpet to fit floor; make design accurately.

Music.—Eleanor Smith, "Spin, Lassie, Spin" and "Rain Coach," *Songs for Little Children*, Part II; Gilchrist, "Rippling, Purling Little Brooklet," in Tomlin's *Children's Songs and How to Sing Them;* Eleanor Smith, "Wind Song;" Reinecke, "Fair Snow White;" Taubert, "The Postilion," "Modern Music" series, Book I; Eleanor Smith, "The Sap has Begun to Flow," *Songs for Little Children*, Part II.

SECOND GRADE.

CLARA ISABELL MITCHELL.

REVIEW OF LESSONS IN ARITHMETIC.

I. *The thermometer.*— Is today colder or warmer than yesterday? How much? How do we measure heat? How does the thermometer measure heat? Who can read what it registers today?

All take thermometers. Find the figure 1 on your thermometer. Find the figure 0. Starting at the bulb where the mercury is, show with your finger how far the mercury rises when there is one degree of heat to measure. Begin at the bulb again and show how high it rises to register 10°, 20°, 30°, 40°.

To what point has it risen today? (Between 30° and 40°.)

How many spaces are there between the marks 30° and 40°? "Five." Draw on the blackboard that part of the thermometer which is between 30° and 40°, divided into five spaces. How many degrees between 30 and 40? "Ten." How many spaces? "Five." Then how many degrees must each space stand for? "Two." Count and see. Count by twos: "Two, four, six, eight, ten." Call the first space 32°, the second 34°; and so on.

Now read the temperature today: "34°." How is the thermometer marked, beginning at 0? "0, 10, 20, 30, 40, 50, 60," and so on, to 220.

You have been counting by tens. This is the way they are written: